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ABSTRACT

The effects of the use of computer-enhanced instruction with remedial students were assessed, using 4,293 ninth through twelfth graders--3,308 Black, 957 White, and 28 Other--involved in the Governor's Remediation Initiative (GRI) in Georgia. Data sources included the Comprehensive Tests of Basic Skills (CTBS), a data collection form developed for the study, and scores from tests accompanying each module of the computer-enhanced curriculum. Data were analyzed using the Statistical Package for the Social Sciences (1984). Analyses of variance were conducted on selected variables. The computer-based instruction used was found to be effective and showed superiority to traditional classroom instruction for the remedial students in the program. All comparisons showed significant gains on the CTBS, with the exception of the tenth-grade gain for subtest concepts and applications. The average gain for all students on total math was 4.772 normal curve equivalents. The magnitude of progress is still in question as the CTBS gain scores may not be representative of the math curriculum and the module unit tests are not norm referenced. GRI administrators need to reexamine in-depth the use of classroom aides, evaluate the module test items for sex bias, check the program screening process for racial bias, assess student gains for various racial categories, and assess any standardized assessment instrument used for evaluation of the project for criterion-related validity before use. Ten tables are provided. Lists of software and primary instructional materials, and the GRI Math Lab Data Collection Score Report and Demographics Forms for 1986 are appended. (TJH)

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Analysis of the Effects of the Computer Enhanced Classroom on the Achievement of Remedial High School Math Students

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Analysis of the Effects of the

Computer Enhanced Classroom on the

Achievement of Remedial High School Math Students

The Governor's Remediation Initiative (GRI) is a project funded since 1983 with grants initially from the Ford Foundation and later from the Jobs Training Partnership Act (Governor's Remediation Initiative, 1987). The purpose of GRI was "...to develop computer-assisted instruction (CAI) in high school mathematics and reading...[for]...high school students [who] had scored below average in standardized tests and were not responding well to traditional instruction" (McCaskill & Norton, 1987, p. 21). A curriculum was developed which encompassed a traditional scope and sequence of skills including units in whole numbers, decimals, fractions, percent, word problems, measurement, geometry, and elementary algebra to match the South Carolina Basic Skills Assessment Program (Governor's Remediation Initiative, 1987). A significant component of the project included evaluation of more than 1000 commercially available software titles and the purchase of approximately 115 titles (see Appendix A) for each class. Also, computerized prescription of individual lessons, on-line communications, and traditional instructional materials were provided for each teaching unit (see Appendix B).

Students served by the project were classified remedial on the basis of either one of two criteria. One was a pre-assessment in the bottom quartile on the California Test of Basic Skills. The other was failure of the student to pass the BSAP criterion reference test in mathematics. The project restricted maximum enrollment in any class to fifteen (15) students without an aide or twenty (20) students with an aide. Although recommendations were to not use the remedial math labs for special education students, a few students classified as such were placed in the computer enhanced rooms.

A number of questions were investigated as part of this study. First, we set out to assess the overall effect of the project in teaching math and helping the remedial students "catch up." For this we used an evaluation model suggested in the Comprehensive Tests of Basic Skills Evaluator's Handbook (1982). This model uses no control group and was first described by Tallmadge and Wood (1978) in reference to Title I evaluations. In an effort to avoid the criticisms of inappropriate achievement tests and selectively favorable bias (Tallmadge and Horst, 1977), we used both a standardized test (CTBS) and project authored unit tests as dependent variables. We tried to collect data from all schools to eliminate differential selection. The unit tests were given after each module of math was completed and served to control for artificially inflated gains (Tallmadge and Horst, 1978). The typical effect of computer-based instruction is a gain of approximately one third of a standard deviation greater achievement (mean effect size) when compared to traditional instruction (Kulik, Bangert, Williams, 1983). Our study was greater in size and duration of computerized instruction than usually reports in the literature so we anticipated comparatively larger improvement.

Several recent studies have examined the differential math achievement of high school students with respect to sex (Fennema, Walbert and Marrett, 1985; Ethington and Wolfe, 1984; Stockard and Wood, 1984). There still is no agreement on the size of these differences or a supported explanation of the reasons for the differences. We wished to take another look at our specific population.

Because computer enhanced instruction requires a large investment per student, there is always a question as to how many students can use a given computerized classroom and maximize the learning. Most recommendations on the number of computers per class and the number of pieces of software needed are experienced speculation at best. Since all classrooms were supported with identical furniture and exactly three computers (excluding a teacher work station not used for instruction), we wished to examine the effect of class size and the use of an aide.

Finally, we examined the data with respect to grade (9 through 12) and compared the results with an analysis of similar data from a 1985 pilot involving seven (7) schools (Gallini, 1986). This was to assess the projected replicability of the study.

Method

Subjects

All subjects were secondary school math students who were placed in remedial classes on one of two criteria. These were a ranking in the bottom quartile of the CTBS or failure on the BSAP criteria reference test for the State of South Carolina. A total of 4293 students were involved. Tables 1, 2, and 3 show a breakdown of the number of students by sex, race and grade. All sixty-five high schools in the project were asked for data. Six high schools failed to report usable data. There were no apparent differences as to the location and quality between these schools and those which did respond. They simply failed to give the posttest or did not get the scoring to us in time for this study. In one class in one high school, an investigation revealed that the scores should be considered invalid as the teacher did not follow the prescribed reporting procedure and submitted meaningless numbers. Another teacher in the same school did respond correctly.

Instrumentation

Independent variable data were received by Data Collection Form (See Appendix C). The data collection effort was explained to the teachers in their February, 1986 meeting and the need for accuracy was stressed. The DCF was mailed to each teacher in April with a request for return by June 15. Electronic mail was used to answer questions and troubleshoot collection difficulties. The DCF asked for each student's grade, sex, race, attendance history (coded), placement comments (coded), class period, and the presence of an aide.

One dependent measure was obtained from the math subtests of the CTBS. Subtest 6

represented math computation skills, subtest 7 represented math concepts and applications and total math was the average value of the two subtests. The gain score in Normal Curve Equivalents (NCE's) was produced by subtracting the pretest score from the posttest score for the two subtests and total math. NCE's have a mean of 50, standard deviation of 21 and equal percentile rank at 1, 50, and 99. NCE's are used to control for the effects of natural maturation in achievement gains where no control group is possible. For a discussion of the CTBS NCE's and the reliability and validity of the test see the CTBS Norms Book Forms U and V (1983) and the CTBS Technical Report Forms U and V (1984).

Another dependent variable was the test score that accompanied the successful completion of each module in curriculum. Each student took a diagnostic test for each major unit (Whole Numbers for example), a mastery test for each subunit (Addition of Whole Numbers) and a Cumulative Review Test. Mastery was set at 80% correct and the teacher had the instructions to represcribe and retest with a different form if a student did not achieve an acceptable score. Each teacher reported the number of modules successfully completed by each student for the year. As stated before, these modules contained objectives which corresponded to the South Carolina BSAP standards and could be thought of as a criterion measure of the students' progress. Pace and content validity of these objectives were provided in a report by Louise Smith (1986). Even though each subunit test only contained 20 to 40 times, the modules completed assumed testing over approximately thirty such tests. In other words, a student completing 33 modules (the mean for all students) would have taken 33 subunit tests, several prescriptive tests and several cumulative reviews. This can be conceived as one large measure of math achievement with several hundred items for each unit. In this sense, reliability of the total measure of math achievement can be supported though there was no practical way to compute a traditional reliability coefficient.

Analyses

All data were analyzed using the Statistical Package for the Social Sciences (1984). Frequency counts and percentiles were produced for the independent variables. Descriptive statistics were produced for the dependent measures broken down by independent variables plus school, class and teacher. Independent t-tests were performed between dichotomous groups gains (sex, race, aide) and ANOVA was performed across special education classification. ANOVA was performed across the variables school, teacher and class. For these analyses traditional alpha levels were considered as acceptable (.05 and .01). Dependent t-tests were performed for pre-post test gains for each grade on CTBS subtest and Computation, CTBS subtest Application and COncepts and Total Math. Because of possible correlation between each subtest and the total math measure, a strict alpha of .001 was considered necessary for indicating a significant difference on the pre-post test analysis. A correlation matrix including all dependent measures was produced

including a scatterplot between the two dependent measures, CTBS Total Math gain and number of modules completed.

All comparisons showed statistically significant gains on the CTBS with the exception of the 10th grade gain for subtest Concepts and Applications. These data are summarized in Table 4. The average gain for all students on Total Math was 4.772 NCE's.

The independent variables sex indicated no difference between male and female students on the CTBS variables (pretest, posttest, gain score), but did show a significant difference in the number of math modules mastered. Males outperformed females by an average of 2.94 units completed. This data is summarized in Table 5.

On the variable race, 2 Asian, 1 Hispanic and 8 other subjects were excluded and only the white/black classifications were considered. Significant differences were indicated between all CTBS measures (pretest, posttest, gain), but not between the number of modules successfully completed. The white group started 3.74 NCE's ahead, finished 5.019 NCE's ahead and gained 1.28 NCE's more than the black group. This data is summarized in TAble 6.

There were significant effects indicated with regard to the availability of an aide in the class. The group without an aide outperformed the group with an aide by 1.29 NCE's on the CTBS total gain. A subsequent analysis indicated that there was a significant difference between the pretest scores on the CTBS for these two groups where the classes with aides started 1.04 NCE's ahead. The classes with aides completed an average of 5.48 more modules than the classes without aides. This was a significant difference. These results are shown in Table 7.

There were no significant differences between special education classifications including those students claimed by the teacher to be "misplaced." Some groups did not have enough subjects for a meaningful analysis (emotionally handicapped, n=4; physically handicapped, n=2). Regardless, the special group gained less than the overall group by 1.34 NCE's. This data is reported in Table 8.

The mean number of modules completed by all students was 33.06. The correlation between the number of modules completed the CTBS total gain was $r = .0548$. A subsequent correlation between the CTBS total gain and those students with a number of modules completed less than 20 or greater than 45 was $r = .062$. This data is summarized in Table 9.

The breakdown of the dependent variables by school, teacher and class and the following ANOVA by school showed significant differences between independent variables for both modules and the CTBS total gain. These results are summarized in Table 10.

Discussion

The expected gain of one third of a standard deviation based on the meta-analysis of 51 studies by Kulik, Bangert, and Williams (1983) is consistent with the 4.77 NCE gain achieved in this study where out standard deviation is 21. This is particularly true as Kulik, Bangert and Williams found slightly smaller gains for mathematics instruction and longer term computer-based instruction. The lack of a gain for 10th graders on concepts and applications might be due to several factors. One is that the curriculum at that point simply does not include the material tested.

Another is that the form and level change that occurs as one moves through the CTBS testing program resulted in the 10th graders taking a test that was "harder" in some way than the form and level offered in 9th grade. Direction following and reading level for concept questions may have been a problem for students in the bottom quartile. Finally, since NCE's are based on normal maturation and the population used in this research might be developmentally behind, the NCE's might not have been accurate at a critical biological stage for these students. Likewise, teaching concepts and applications to adolescents might be difficult for the sample biological reason. Unfortunately, this study does not have any answers except speculation for this finding.

The sex differences that appear for modules but not for the CTBS measures are the first indication of several results that the CTBS does not measure the same thing as the criterion testing that accompanies the curriculum. A commercial test may have removed sex bias during test construction at the possible expense of predictive validity or the items written for the module mastery testing might have been biased in favor of the males. If the two dependent variables measure substantially differential achievement and the other accurately measuring non-differential achievement within sex. The many differing theories for sex related achievement differences do not appear to address this situation (Fennema, Walberg and Marrett, 1985). The possible explanation we can offer that is not dependent on the nature/nuture controversy is that the teachers graded more strictly for the female students. This is difficult to believe as the answer key is the same for everyone and no difference can be superficially observed between male and female teachers across their students achievement.

In a reversal of the above, differences were found between black and white students on all CTBS measures while there were no significant differences in the number of math modules successfully completed. The average number of modules completed by blacks was 33.06 while the average number completed by whites was 33.35. CTBS differences are evident both in pretesting and in the gains achieved (in favor of the white students). Possible explanations are that the CTBS contains some bias when the population tested is mostly black. It seems impossible that the teachers favored the white students when the number of modules completed is almost identical and the nationally normed test contains the differential results. Since the white students had a higher starting average, they may have achieved more due to natural ability, but this is not collaborated by advancement through the scope and sequence at a faster rate. Again it is possible that the two dependent measures simply address different constructs.

With respect to the use of aides, we again get a different result on the two dependent measures. The classes with aides started with a small but significant advantage over the non-aide classes in NCE (1.04). The two groups showed no significant differences at the posttest as the two means were only .11 NCE's apart. The gain, through, shows a significant advantage for the non-aide group of 1.29 NCE's. Meanwhile the module advancement shows a 5.52 advantage for the classes with aides. This conflicting data does not suggest any practical advice on the hiring of aides, but it does suggest that one again consider if the two dependent measures have common ground.

The ANOVA across schools, teachers and classes (each within the other) showed highly significant differences for both dependent variables. With 59 schools, 84 teachers and 305 classes it became apparent that post hoc tests (like Sheffee) were not going to reveal a rational pattern. Observation of the data did indicate that the large mean differences between schools were presumed to be attributed to environmental factors. Large mean differences between teachers were assumed to be attributed to that teacher's effectiveness. Large differences between classes were thought to be initial placement, class size or some unidentified factor. Without the ability to measure the characteristics of each school, teacher or class there is no way to be more specific. One anecdotal point is that each certified teacher received identical training over the summer, identical furniture and equipment was provided to each school and each student used an identical set of materials. Two of the most effective teachers were known to dislike each other and use a different style with the students. The instructors of the summer training were surprised that one school with a mediocre reputation gained scores across classes that were in the top five in the project. One school where both teachers were admired as leaders and most experienced, having been with the project for several years, did quite poorly in the rankings. Predicting short term effectiveness in small samples continues to appear to be difficult, and this study supports the contention that evaluation of effectiveness should not be contingent on such a model. No recommendations for a universal class size or interpretable trends in this data can be offered. Given that two principles called and one wrote the researchers asking for data comparisons with regard to individual teachers, this point does not seem to be accepted by some.

The correlation of .0548 between the two dependent measures certainly indicates a lack of concurrent validity. The correlation of .06205 between those students completing less than 20 or more than 45 modules and the CTBS gain confirms the lack of a relationship. We literally brainstormed a number of possible reasons for these results. One was that the students forgot what they learned so that over the year the number of modules of materials "retainable" was the important criteria. Another guess is that the students sometimes learned a few modules well and sometimes a larger number less well despite the mastery testing. Another was that the CTBS items simply bore little relationship to the mastery test items. Regardless, the administrators of the project now have a tough time deciding what is the best measure for guiding the future directions of computer-based instruction in this state.

Tallmadge and Horst (1978) suggest:

> It seems highly probable that, where the content of a test shows a low correlation with the content of a curriculum, the test will be insensitive to whatever gains the curriculum might produce. The problem is aggravated by the fact that students gain only a few raw score points on a <u>total</u> standardized test during a normal school year. If only a few sections of a test are relevant to the curriculum, even dramatic gains on these sections may have little impact on the total scores....It seems to us that the only valid way to assess the effects of an instructional treatment is to use a test that measures what was taught. Not item by item of course--but the test items should be samples for

the same domain as the teaching/learning exercises (pp. 9-10).

Given that reasoning, the module unit tests are the best evidence of the effectiveness of the computer-based instruction even though we cannot say how the effort compares to groups outside the sample. How many module completions show poor, good or average performance? A suggestion for the future would be to compare the progress across the GRI curriculum with other similar programs for correspondence of material. This should provide some answer to the question.

In conclusion, there is ample evidence that the computer-based instruction used in this project was effective and showed superiority to traditional classroom instruction for these remedial students. The magnitude of the progress is still in question as the CTBS gain scores may not be representative of the math curriculum and the module unit tests are not norm referenced. It is likely that the 4.77 NCE gain is an underestimate of the true learning that took place.

Several findings are important for the GRI administrators. The use of aides might be reexamined in depth. An evaluation of the module test items for sex bias is suggested. The screening process should be checked for race bias and then the gains by race followed so that the entire process is understood. Lastly, any standardized instrument used for evaluation of the project could be checked for criterion related validity before its use.

TABLE I

Sample By Sex

SEX	N	%
Male	2266	52.8
Female	2022	47.1
Missing	5	.1
TOTAL	4293	

TABLE II

Sample By Race

RACE	N	%
White	957	22.3
Black	3308	77.1
Asian	2	.0
Hispanic	1	.0
Other	8	.2
Missing	17	.4
TOTAL	4293	

TABLE III

Sample By Grade

GRADE	N	%
9	1213	28.3
10	1362	31.7
11	1021	23.8
12	671	15.6
Missing	26	.6
TOTAL	4293	

TABLE IV

Significance Tests For CTBS Gains

Grade	Test 6 Fundamentals NCE Gain	Test 7 Concepts NCE Gain	Total Math NCE Gain
9	2.720 (N=1061)* -.77 (N=202)+	1.702 (N=1059)* -2.97 (N=204)+	3.140 (N=1053)*
10	8.031 (N=1054)* 12.99 (N=137)+	-.641 (N=1004) 5.04 (N=168)+	4.487 (N=999)*
11	11.187 (N=847)* 13.14 (N=57)+	3.862 (N=847)* 6.27 (N=66)+	6.436 (N=844)*
12	8.618 (N=570)* 9.98 (N+47)+	3.361 (N=559)* 5.67 (N=48)+	5.829 (N=560)*
All	7.278 (N=3546)	2.192 (N=3483)	4.772 (N=3470)

* $P \leq .001$

+ 1984-1985 data from previous pilot study is included for comparison (Gallini, 1986).

TABLE V

Effect of Demographic Variable Sex on Dependent Variables CTBS Gain and Modules Completed

Variable	N	X	t value	
Pretest CTBS Total Math	M	1997	23.8	.24
	F	1811	23.7	
Posttest CTBS Total Math	M	1903	28.5	.09
	F	1738	28.4	
CTBS Total Math Gain	M	1796	4.9	.38
	F	1671	4.7	
Modules Completed	M	2067	31.9	-5.31
	F	1840	34.8	

$p \leq .001$

TABLE VI

Effect of Demographic Variable Race on Dependent Variables CTBS Gain and Modules Completed

Variable		N	X	t value
Pretest CTBS Total Math	W	839	26.7	7.49**
	B	2947	22.9	
Posttest CTBS Total Math	W	767	32.4	8.46**
	B	2853	27.4	
CTBS Total Math Gain	W	733	5.8	2.30*
	B	2713	4.5	
Modules Completed	W	870	33.0	-.43
	B	3015	33.4	

** $p \leq .01$

* $p \leq .05$

TABLE VII

Effect of Independent Variable Aide on Dependent Variables CTBS Total Math and Modules Completed

Variable		N	X	t value
Pretest CTBA Total Math	No Aide	1973	23.3	-2.47*
	Aide	1839	24.3	
Posttest CTBA Total Math	No Aide	1850	28.5	.22
	Aide	1794	28.4	
CTBS Total Math Gain	No Aide	1764	5.4	2.86**
	Aide	1706	4.1	
Modules Completed	No Aide	2334	30.96	-9.77***
	Aide	1678	36.43	

* $p \leq .05$

** $p \leq .01$

*** $p \leq .001$

TABLE VIII

Test for Significant Effect of Special Education Student Classifications on Dependent Variable CTBS Total Math Gain

Group Membership*	N	X
Misplaced (teacher judgment)	36	-1.56
Repeater (not graduation track)	325	3.8
Educable Mentally Retarded	79	1.8
Learning Disabled	79	4.6
Emotionally Handicapped	4	-2.0
Physically Handicapped	2	-6.0

*Some teachers indicated multiple classification. The 1st label was used in these cases.

ANOVA

Source	DF	SS	MS	F
Between Groups	5	1501	300.2	1.851
Within Groups	519	84184	162.2	
Total	524	85685		

TABLE IX

Mean Number Modules Completed and Correlation of Modules Completed with CTBS Total Math Gain

Modules Completed

Grade	X	SD	N
9	30.631	15.7	1136
10	33.072	17.1	1214
11	36.149	18.8	955
12	34.724	17.7	583
All	33.306	17.4	3912

Modules Completed and CTBS Total Main Gain

$r = .0548$
$n = 3.65$
$p \leq .001$

Modules Completed (20> mc >45) and CTBS Total Math Gain

$r = .06205$
$n = 1526$
$p \geq .01$

TABLE X

Breakdown and ANOVA for I.V.'s School, Teacher and Class for DV's Modules and CTBS Total Math Gain

D.V. Modules
ANOVA

Source	SS	DF	MS	F
Between Groups	$.4995 \times 10^6$	55	9081.4	51.69*
Within Groups	$.6762 \times 10^6$	3849	175.7	
Total	$.1176 \times 10^7$	3904		

D.V. CTBS Total Math Gain
ANOVA

Source SS		DF	MS	F	
Between Groups		82443.9	53	1555.6	10.09*
Within Groups		$.5262 \times 10^6$	3412	154.2	
Total	$.6086 \times 10^6$	3465			

$p \leq .001$

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Appendix A

SOFTWARE LIST

Disk #	Pub.	Program Name
1	MCWS	Adding Fractions
2	Conduit	Algebra Drill & Practice I
3	Conduit	Algebra Drill & Practice II
4	Eduware	Algebra 1
5	Eduware	Algebra 4
6	EducAct	Algebraic Expressions
7	EduAct	BMC Meas w/ruler; p, C, A
8	SterlSwift	ArithClass: Fracts - BasicConc
9	SterlSwift	ArithClass: Multi. - Whole Nos
10	SterlSwift	ArithClass: Gmes - Whole #'s Fra.
11	EducAct	BMC ConvFracts & %: Probs with %
12	Randomhse	Basic Math: Fracts & Games
13	EducAct	BMC Fract; Add & Subtraction
14	EducAct	BMC Graph, Mean, Median, & Mode
15	EducAct	BMC Rounding off Numbers
19	MCWS	Equations
20	EducAct	Solving Equations I, II, & III
21	Hartley	Expanded Notations (11-06)
23	EduSoft	Fract Recognition/Mixed No Rec.
24	Eduware	Fractions
25	NTS	Gathering Speed Set 1
26	NTS	Gathering Speed Set 2
29	MECC	Mathematics Volume 2 Measurem
30	MECC	Mathematics Volume 1 Graphing
31	Hartley	Intergers/Equations I

32	Hartley	Integers/Equations II
33	AvantGuard	Introductory Algebra
34	Indianhead	Laser Chaser
35	GeorgeEarl	Lessons in Algebra
36	Davidson	Math Blaster
37.1	Hartley	Math Concepts I
37.2	Hartley	Math Concepts II
38	Milliken	Math Sequences: Addition
39	Milliken	Math Sequences: Decimals
40	Milliken	Math Sequences: Division
41	Milliken	Math Sequences: Equations
42	Milliken	Math Sequences: Fractions
43	Milliken	Math Sequences: Integers
44	Milliken	Laws of Arithematic Sequence
45	Milliken	Math Sequences: MeaaSequences
46	Milliken	Math Sequences: Multiplication
47	Milliken	Math Sequences: NumReadiness
48	Milliken	Math Sequences: Percents
49	Milliken	Math Sequences: Subtraction
51	NYTecCol	Mathematics, Volume Two
52	MECC	Elementary Volume 0 - Geometry
53	EME	Metric System Tutor
54.1	Hartley	Metrics Skills I
54.2	Hartley	Metrics Skills II
55	MiltBrad	Mixed Numbers
56	NTS	Moving On, Set 2
57	MCWS	Multiplying Fractions
58	Hartley	Number Words Level 2
59	MCWS	Multiplying Fractions

60	MECC	Mathematics Volume 3 - Geometry
67	Ency Brit	Prob Solv in Algebra (1-7)
69	EducAct	Read & Solve Math Problems (1-5)
70	EducAct	Read & Solve Math Problems (6-10)
71	Aquarius	Solv Word Probs. I
72	Aquarius	Solv Word Probs II
73	Sunburst	Solving Equations & Inequities
75	Sunburst	Survival Skills
76	Sunburst	Teasers by Tobbs
78	THESIS	The Big Math Attack
79	MECC	Elementary Volume 9: Geometry
80	F1 A&M	Word ProbSolving Vol 1
81	F1 A&M	Word ProbSolving Vol 2
83	F1 A&M	Word ProbSolving Vol 3
86	Ency Brit	Prob Solv in Algebra (15-21)
92	LearnRes	I/CT Math Power - Whole Nos. (+)
93	LearnRes	I/CT Math Power - Whole Nos. (-)
94	LearnRes	I/CT Math Power - Whole Nos. (x)
95	LearnRes	I/CT Math Power - Whole Nox. (/)
96	LearnRes	I/CT Math Power - Fract - Concepts
97	LearnRes	I/CT Math Power - Fract - Addition
98	LearnRes	I/CT Math Power - Fract - Subtract
99	LearnRes	I/CT Math Power - Fract - M & D
100	LearnRes	I/CT Math Power - Dec - Con (1-6)
101	LearnRes	I/CT Math Power - Dec - (7-10)
102	LearnRes	I/CT Math Power - % - Concepts (1-5)
103	LearnRes	I/CT Math Power - Percent (7-10)
105	EducAct	BMC Fractions: Mult & Division
106	EducAct	BMC Decimals: A, S, M, & Division
107	EducAct	BMC Whole Nums: A, S, M, & Division

108	Intell	Harvey by Primes (1984)
109	Ventura	Geometry Concepts
110	Intell	Graphing Is Fun, disk 1
111	Gamco	Telling Time
112	Intell	Rounding & Estimation
113	Intell	Fraction Word Problems
114	Intell	Graphing is Fun, disk 2
115	Apple	Apple LoGo II
116	EAI	Read & Solve Math Prob. II (2 disks)

APPENDIX B

Primary Instructional Materials

Code: P = Print, A = Audio, V = Visual

Title	Pub.	Code
CSM: Understanding & Using Whole Numbers, Levels 1-10	(PSC)	AV/P
CSM: Understanding & Using Fractions, Levels 1-10	(PSC)	AV/P
CSM: Understanding & Using Decimals, Levels 1-10	(PSC)	AV/P
CSM: Understanding & Using Percents, Levels 1-10	(PSC)	AV/P
Introduction to Algebra		AV/P
PowerPac B, C, D, E & F	(IILC)	A/P
ICLP 9399, 9401-9, 9411-15, 9417,m 9423, 9425-26, 9431-34, 9441-4		A/P
Estimation - Your Key to Succes	(MTH)	A/P
Basic Arithmetic, 2nd Ed.	(SCF)	P
Basic Mathematics: A Program for Semi-Independent Study	(HEA)	P
Figure It Out, Books 1, 2 and 3	(FOL)	P
Arithmetic for Careers	(DEL)	P
Arithmetic, 4th ed.	(AW)	P
Basic Arithmetic, 3rd Ed.	(MER)	P
Number Power, 1, 2, 3, 4, & 5	(CBI)	P
Basic Essentials of Mathematics, Part one & Part Two	(SV)	P
Mathematics in Daily Living, Books 1, 2, 3, & 4	(SV)	P
PCSP Modules A, B & C, D	(HM)	P
Basic Mathematics Skills	(MM)	P
Essentials of Mathematics	(HBJ)	P
Refresher Math, 8th Ed.	(STN)	P
Fractions Package, Books 1-8	(PACE)	P
FST. 20, 23, 25, 35-39	(CRV)	AV

GED (Test 5) The Mathematics Test	(CBI)	P
Programmed Math for Adults, Problem Book Six	(MGH)	P
Programmed Math for Adults, Problem Book Seven	(MGH)	P
Basic Skills with Decimals and Percents	(CAM)	P
Mathematics for Careers: Percent	(DEL)	P
Developmental Math, Module IV, VI	(AMD)	P
Spectrum - Red	(?)	P
Math House Proficiency Review Tapes - C	(MTH)	A/P
FST-AB-01, 05, 07, 09	(CRV)	A/V
Programmed Math #8 & #12	(MGH)	P
Map Skills	(CP)	P
FST-A-01, 07	(CRV)	A/V
FST-C-01	(CRV)	A/V
FAF-02, 03	(CRV)	A/V
FAC-02	(CRV)	A/V
Mathematics: Positive and Negative	(RRF)	P
FST-CA-01, 02 & 03	(CRV)	A/V
Algebra	(SV)	P

PUBLISHERS'S CODES AND ADDRESSES

Code	Names and Addresses
PSC	Pathescope Educational Media, Inc. 71 Weyman Avenue New Rochelle, NY 10802
SV	Steck-Vaughn Austin, Texas
CBI	Contemporary Books, Inc. 180 North Michigan Avenue Chicago, IL 60601
DEL	Delmar Publishers, Inc. (Division of Van Nostrand Reinhold, Ltd.) Albany, NY 12205
HM	Houghton Mifflin Co. One Beacon St. Boston, Mass. 02107

IILC	Imperial International Learn Corp. Kankakee, IL 60901
MM	Media Materails, Inc. 2936 Remington Avenue Baltimore, MD 21211
MTH	Math House Division of Mosaic Media, Inc. Glen Ellyn, IL
AW	Addison Wesley Redding, Mass.
MGH	McGraw-Hill Trafalga House Publishing, Inc. 145 East 52nd St. New York, NY 10022
AMD	Paul S. Amidon & Assos., Inc. 1966 Benson Avenue St. Paul, Minn. 55116
MFR	Charles E. Merrill Publishing Co. A Bell & Howell Co. Columbua, Ohio 43216
FOL	Follett Publishing Co. A Division of Follett Corp. Published & distributed by Cambridge; The Adult Education Co. 888 Seventh Ave. New York, NY 10106
PACE	Pace Learning Systems, Inc. P.O. Box AG University, ALA 35486
SCF	Scott, Foresman and Co. Glenview, IL
RRF	Rehabilitation Research Foundation P.O. Box BV University, ALA 35486
HEA	D.C. Heath and Co. Lexington, Mass.
CP	Continental Press, Inc. Elizabeth, PA 17022
STN	Stein
HBJ	Harcourt Brace Johanovich 1372 Peachtree Street, N.E. Atlanta, GA 30367

Governor's Remediation Initiative
Math Lab Data Collection - 1986
Page Two, Score Report Form

Please report all results in scale scores. Dates should be in numerical form (03/14/85). If you have comments on any testing conditions that might have affected the results, please put them in the spaces below:

_____

_____

Student Initials	Test 6 Form	Level	Pre	Data	Post	Data	Test 7 Form	Level	Pre	Data	Post	Data

You should have completed two pages per class. Page one is the Demographics Form while page two is the Score Report Form. We have asked for initials on both pages in order to line up the date and in case the pages get separated. If you have any problems or questions, please call the Govenor's Remediation Initiative at 323-2120 or leave us a "mall" message on the ____ computer.

Governor's Remediation Initiative
Math Lab Data Collection - 1986
Page One, Demographics Form

School_____ **Instructor**_____

Is there an assigned aide? _____
Period: 1st 2nd 3rd 4th 5th 7th 8th (circle one)
Number of students missing test results_____

Student Initials	Grade	Sex	Race	Attendance Code	Comment Code	Modules Completed

Attendance code: A=transfer B=withdrew C=excess absences (more than 10) D=Suspended
Comment code: E=misplaced in lab F=repeater EMH H=LD I=EH J=Physical handicap
Sex: f or m Race: w=white b=black a=Asian h=Hispanic o=other minority

Please comment on any students or class conditions that might affect this data coollection:

_____
_____
_____
_____
_____